What Is Claimed Is:

1. A catalyst comprising a mixed metal oxide having the empirical formula

$$Mo_aV_bM_cX_dO_e$$

wherein M is an element selected from the group consisting of Te, Sb and Nb,

wherein X is an element selected from the group consisting of Sc, Y, La, Re, Ir, Cu, Ag, Au, Zn, Ga, Si, Ge, As, Pb, S, Se, Sn, Bi, F, Cl, Br and I, and

wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0 to 1 and e is dependent on the oxidation state of the other elements;

with the proviso that, when d = 0, M is selected from the group consisting of Nb and Te, and

with the further proviso that, when d = 0 and M = Te, $0.01 \leq b < 0.50$ or $0.17 < c \leq 1.0$.

2. The catalyst according to claim 1, produced by the process comprising:

(i) admixing compounds of elements Mo, V, M and X, as needed, and a solvent comprising water to form a first admixture containing at least 2 but less than all of said elements Mo, V, M and X;

(ii) heating said first admixture at a temperature of from 80°C to 150°C for from 5 minutes to 48 hours;

(iii) then, admixing compounds of elements Mo, V, M and X, as needed, with said first admixture to form a second admixture containing elements Mo, V, M and X, in the respective atomic proportions a, b, c and d, wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0 and d = 0 to 1;

(iv) heating said second admixture at a temperature of from 50°C to 300°C for from 1 hour to several weeks, in a closed vessel under pressure;

(v) recovering insoluble material from said closed vessel to obtain a catalyst.

3. The catalyst according to claim 2, wherein said process further comprises:

(vi) calcining said recovered insoluble material.

4. The catalyst according to claim 3, wherein said calcination comprises heating said recovered insoluble material to a first temperature in an oxidizing atmosphere, then heating the so-treated recovered insoluble material from said first temperature to a second temperature in a non-oxidizing atmosphere.

5. The catalyst according to claim 2, wherein said closed vessel is under autogenous pressure.

6. The catalyst according to claim 2, wherein said solvent comprising water consists of water.

7. The catalyst according to claim 2, wherein said first admixture comprises the elements Mo, M and X.

8. The catalyst according to claim 7, wherein M = Te.

9. The catalyst according to claim 2, wherein said first admixture comprises the elements Mo and M.

10. The catalyst according to claim 9, wherein M = Te.

11. A process for producing a catalyst comprising a mixed metal oxide having the empirical formula

$$Mo_aV_bM_cX_dO_e$$

wherein M is an element selected from the group consisting of Te, Sb and Nb,
wherein X is an element selected from the group consisting of Sc, Y, La, Re, Ir, Cu, Ag, Au, Zn, Ga, Si, Ge, As, Pb, S, Se, Sn, Bi, F, Cl, Br and I, and
wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0, d = 0 to 1 and e is dependent on the oxidation state of the other elements;
with the proviso that, when d = 0, M is selected from the group consisting of Nb and Te, and
with the further proviso that, when d = 0 and M = Te, $0.01 \leq b < 0.50$ or $0.17 < c \leq 1.0$,

the process comprising:

(i) admixing compounds of elements Mo, V, M and X, as needed, and a solvent comprising water to form a first admixture containing at least 2 but less than all of said elements Mo, V, M and X;

(ii) heating said first admixture at a temperature of from 80°C to 150°C for from 5 minutes to 48 hours;

(iii) then, admixing compounds of elements Mo, V, M and X, as needed, with said first admixture to form a second admixture containing elements Mo, V, M and X, in the respective atomic proportions a, b, c and d, wherein, when a = 1, b = 0.01 to 1.0, c = 0.01 to 1.0 and d = 0 to 1;

(iv) heating said second admixture at a temperature of from 50°C to 300°C for from 1 hour to several weeks, in a closed vessel under pressure;

(v) recovering insoluble material from said closed vessel to obtain a catalyst.

12. The process according to claim 11, further comprising:

vi) calcining said recovered insoluble material.

13. The process according to claim 12, wherein said calcination comprises heating said recovered insoluble material to a first temperature in an oxidizing atmosphere, then heating the so-treated recovered insoluble material from said first temperature to a second temperature in a non-oxidizing atmosphere.

14. The process according to claim 11, wherein said closed vessel is under autogenous pressure.

15. The process according to claim 11, wherein said solvent comprising water consists of water.

16. The process according to claim 11, wherein said first admixture comprises the elements Mo, M and X.

17. The process according to claim 16, wherein M = Te.

18. The process according to claim 11, wherein said first admixture comprises the elements Mo and M.

19. The process according to claim 18, wherein M = Te.

20. A process for producing an unsaturated carboxylic acid which comprises subjecting an alkane, or a mixture of an alkane and an alkene, to a vapor phase catalytic oxidation reaction in the presence of a catalyst according to claim 1.

21. A process for producing an unsaturated nitrile which comprises subjecting an alkane, or a mixture of an alkane and an alkene, and ammonia to a vapor phase catalytic oxidation reaction in the presence of a catalyst according to claim 1.